Federated learning for 6G communications: Challenges, methods, and future directions

Year: 2020 | Citations: 305 | Authors: Yi Liu, Xingliang Yuan, Zehui Xiong, Jiawen Kang, Xiaofei Wang

---

Abstract

As the 5G communication networks are being widely deployed worldwide, both industry and academia have started to move beyond 5G and explore 6G communications. It is generally believed that 6G will be established on ubiquitous Artificial Intelligence (AI) to achieve data-driven Machine Learning (ML) solutions in heterogeneous and massive-scale networks. However, traditional ML techniques require centralized data collection and processing by a central server, which is becoming a bottleneck of large-scale implementation in daily life due to significantly increasing privacy concerns. Federated learning, as an emerging distributed AI approach with privacy preservation nature, is particularly attractive for various wireless applications, especially being treated as one of the vital solutions to achieve ubiquitous AI in 6G. In this article, we first introduce the integration of 6G and federated learning and provide potential federated learning applications for 6G. We then describe key technical challenges, the corresponding federated learning methods, and open problems for future research on federated learning in the context of 6G communications.